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When the light is fixed at the center of curvature, *i. e.* at *D* in Fig. 1,

$$d = 2f,$$

and the same equations give

$$a = \frac{y^2}{2f} + \frac{y^4}{16f^3}.$$

MT. HAMILTON, CALIFORNIA, October 22, 1902.

OBSERVATIONS OF THE ECLIPSED MOON, OCTOBER 16, 1902.

BY ROSE O'HALLORAN.

The atmosphere here 'was very favorable to observation during the total phase of the recent lunar eclipse, which occurred on October 16th, in accordance with astronomical forecast. Some minutes before its symmetry was noticeably impaired, the east limb of the Moon was dimmed by the terrestrial shadow, which within half an hour had successively submerged *Grimaldi*, *Aristarchus*, *Kepler*, *Gassendi*, and *Tycho*. Cirrus clouds flitted by during the half-moon phase, and the crescent was formed before the shadowed surface became discernible. A narrow semicircular strip round the limb was first suffused with the glow of refracted sunlight, wreathing the dark terrestrial hemisphere, and large tracts adjacent to *Tycho*, where lunar seas are scarce, were soon included in this interesting illumination. Though familiar with descriptions of our satellite when eclipsed in recent and former years, the color was more vivid than I anticipated, and, telescopically, it was distinctly pink.

At 9:16 P. M. the shadow was over *Mare Crisium* and the crater *Petavius*, but for some minutes after totality the foreshortened limb west of these features shone with a dull white light. This was succeeded by a luminous pink hue that could not be classed as either coppery or chocolate-colored. Probably it was caused by a mingling of white light with unusually red rays from the atmospheric aureole. At first the central portion of the disk seemed to be shrouded from this beacon of totality, but before long the seas were discernible, even without magnifying power. If an observer were uninfluenced by

known facts, the telescopic view was that of a translucent sphere whose central fires gleamed out more or less through the surface, according to the thickness of the crust. The white streaks so conspicuous at full moon were discernible and conveyed less impression of translucency than the other tracts, which were salmon-colored. The seas were in contrast to both, resembling a dull gray substance on which red light is cast. As the eclipsed orb advanced more centrally, its pink color declined and the time-honored coppery light held full sway for about half an hour. At this stage, but for the familiar outlines of the seas, the Moon seemed like a dusky intruder among the small stars of *Pisces* that shone so brightly through the shadow depths. In color it bore little resemblance to the ashen surface visible when the Moon is young. Before the end of totality the brighter hues reappeared, the pink glow on the east limb as it neared sunlight giving place again to a dull white that lingered until direct rays ended the total phase.

Though no mystery attaches to the encounter between the Earth's shadow and satellite, and its scientific value is limited, still as seen here to full advantage it was an impressive fulfillment of astronomical prediction and theory not soon to be forgotten.

SAN FRANCISCO, October 21, 1902.

PLANETARY PHENOMENA FOR JANUARY AND FEBRUARY, 1903.

BY MALCOLM MCNEILL.

PHASES OF THE MOON, P. S. T.

First Quarter,	. . . Jan. 6,	1 ^b	56 ^m	P. M.
Full Moon,	. . . Jan. 13,	6	17	A. M.
Last Quarter,	. . . Jan. 20,	3	49	
New Moon,	. . . Jan. 28,	8	39	
First Quarter,	. . . Feb. 5,	2	12	
Full Moon,	. . . Feb. 11,	4	58	P. M.
Last Quarter,	. . . Feb. 18,	10	23	
New Moon,	. . . Feb. 27,	2	20	A. M.